the UDDS (in accordance with § 86.115 and appendix I to this part), or, if the soak period has exceeded 36 hours, a full UDDS. Warmup operation must occur within the specific ambient temperature range for the selected test option, as given in table O–96–2 of § 86.1430, except as specified in paragraphs (e)(2)(i) and (ii) of this section. Warmup operation must proceed immediately to the wait time step at § 86.1438(b).

(i) For moderate temperature testing utilizing Cold CO fuel only, the ambient temperature may not exceed 80 °F (27 °C) during warmup operation, or any of the succeeding steps in the CST sequence.

(ii) For the cold temperature pathway only, warmup operation must occur not only within the specific ambient temperature range indicated in table O–96–2 of § 86.1430, but must also occur within 5 °F (3 °C) of the selected test temperature.

### § 86.1433 [Reserved]

### § 86.1434 Equipment preparation.

(a) Immediately prior to the wait time portion of the test run described in § 86.1437 or § 86.1438, or immediately prior to warmup operation, the steps described in paragraphs (b) through (d) of this section must be performed.

(b) Check the device(s) for removing water from the exhaust sample and the sample filter(s). Remove any water from the water trap(s). Clean and replace the filter(s) as necessary.

(c) Set the zero and span points of the analyzer with the electrical spanning network or with analytical gases.

(d) Attach the tachometer to the vehicle in accordance with the analyzer manufacturer's instructions. The manufacturer must ensure, for all test and production vehicles and engines, that the rpm signal is capable of being read by an exhaust gas analyzer via:

(1) A conventional inductive tachometer; or

(2) The onboard diagnostics (OBD) connector, as described under the provisions of § 86.094–17; or

(3) A dedicated electrical lead, marked ''rpm'' and located under the hood, with a female-type, quarter-inch spade terminal. The digital transistor-transistor logic (TTL) signal must span the 0V–5V range at a rate of one pulse per engine revolution, synchronized to the top dead center position.

### §§ 86.1435–86.1436 [Reserved]

### § 86.1437 Test run—manufacturer.

(a) This section describes the test run performed by the manufacturer for its data submittal pursuant to obtaining a certificate of conformity under the provisions of § 86.096–23. The test run consists of the wait time, vehicle preconditioning (optional), and the selected test procedure. The entire test run is performed in accordance with the conditions in the option selected from table O–96–1 of § 86.1430.

(b) *Wait time.* (1) If the vehicle is not already idling, the vehicle is started and allowed to idle freely with the transmission in neutral. The vehicle wait time begins when the vehicle engine speed is between 350 and 1100 rpm. The engine speed must attain the specified idle speed within ten seconds of beginning the idle period. A timer for the wait time portion of the test run will initiate (wt=0) when the vehicle is turned on or when it returns to idle after any transient test procedure, as described in § 86.1432.

(2) Following the first three minutes of idle, this wait time may be interrupted by engine off/restart cycles occurring no more frequently than every five minutes, with each engine off period having a maximum duration of two minutes. Each period of idle following a restart must be a minimum of three minutes in duration. During each idle period, the engine speed must not exceed 1100 rpm or fall below 350 rpm for more than five seconds in any one excursion. The total duration of the wait time, including time at idle and time during engine off periods, is 25 to 30 minutes.

(c) *Optional preconditioning.* Immediately following the wait time, the engine speed is increased to 2500±300 rpm for 25 to 30 seconds or, optionally, the vehicle will undergo loaded operation for a minimum of 30 seconds between the speeds of 30 and 50 mph (48 to 80 kph). The period allowed for preconditioning commences upon attaining the specified rpm or speed range. No more

than ten seconds may elapse between terminating the wait time and attaining the specified rpm or speed range for preconditioning.

(d) Immediately following the wait time, described in paragraph (b) of this section, or, if performed, the optional preconditioning described in paragraph (c), the test procedure as described in paragraphs (e) through (g) of this section is performed on the test vehicle. The general requirements described in paragraphs (d) (1) through (4) of this section apply.

(1) *Exhaust gas sampling algorithm.* The analysis of exhaust gas concentrations begins ten seconds after the applicable test mode begins. Exhaust gas concentrations must be analyzed at a minimum rate of once every 0.75 second. The measured value for pass/fail determinations is a simple running average of the measurements taken over five seconds.

(2) *Void test conditions.* The test immediately terminates and any exhaust gas measurements are voided if the measured concentration of CO plus $CO_2$ falls below six percent or the vehicle's engine stalls at any time during the test sequence.

(3) *Multiple exhaust pipes.* Exhaust gas concentrations from vehicle engines equipped with multiple exhaust pipes must be sampled simultaneously.

(4) *Pass/fail determination.* A pass or fail determination is made for each applicable test mode based on a comparison of the short test standards contained in § 86.096–8(a) for light-duty vehicles and in § 86.096–9(a) for light-duty trucks, and the measured value for HC and CO as described in paragraph (d)(1) of this section. A vehicle passes the test mode if any pair of simultaneous values for HC and CO are below or equal to the applicable short test standards.

(e) *Test sequence—general requirements.* (1) The test sequence consists of an idle mode followed by a high-speed mode. The test timer starts when the conditions specified in this paragraph are met. The overall maximum test time is 290 seconds (tt=290). The test terminates immediately upon reaching the overall maximum test time. A vehicle that has not yielded passing results by the expiration of the overall test time fails the test.

(2) The test sequence begins only after the requirements described in paragraphs (e)(2) (i) and (ii) of this section are met. If these conditions are not met within one minute upon completion of the wait time or, if performed, the preconditioning, the CST must be aborted.

(i) The vehicle is tested with the transmission in neutral or park and all accessories turned off. The engine must be at normal operating temperature (as indicated by a temperature gauge, temperature lamp, touch test on the radiator hose, or other visual observation indicating that overheating has not occurred).

(ii) The tachometer must be attached to the vehicle in accordance with the analyzer manufacturer's instructions.

(iii) The sample probe is inserted into the tailpipe to a minimum depth of 10 inches. If the vehicle's exhaust system prevents insertion to this depth, a tailpipe extension must be used, or the probe may be inserted into the tailpipe to CVS connector through an aperture provided for this purpose.

(iv) The measured concentration of CO plus $CO_2$ must be greater than or equal to six percent.

(f) *Idle mode.* (1) The mode timer starts (mt=0) when the vehicle engine speed is between 350 and 1100 rpm. If engine speed exceeds 1100 rpm or falls below 350 rpm, the mode timer resets to zero and resumes timing. The minimum mode time is 30 seconds. The maximum idle mode length is 90 seconds elapsed time (mt=90).

(2) The pass/fail analysis begins after an elapsed time of ten seconds (mt=10). A pass or fail determination is made for the vehicle and the mode terminated as described in paragraphs (f)(2) (i) through (iii) of this section.

(i) The vehicle passes the idle mode and the mode is terminated at the end of an elapsed time of 30 seconds (mt=30) if the measured values are less than or equal to the applicable short test standards as described in paragraph (d)(4) of this section.

(ii) The vehicle passes the idle mode and the mode is immediately terminated if, at any point between an elapsed time of 30 seconds (mt=30) and

90 seconds (mt=90), the measured values are less than or equal to the applicable short test standards as described in paragraph (d)(4) of this section.

(iii) The vehicle fails the idle mode and the test is terminated if none of the provisions of paragraphs (f)(2) (i) and (ii) of this section is met by an elapsed time of 90 seconds (mt=90).

(g) *High-speed mode.* This mode follows immediately upon termination of the idle mode.

(1) The mode timer resets (mt=0) when the vehicle engine speed is between 2200 and 2800 rpm. If engine speed falls below 2200 rpm or exceeds 2800 rpm for more than two seconds in one excursion, or more than six seconds over all excursions within 30 seconds of the final measured value used in pass/fail determination, the measured value is invalidated and the mode continued. If any excursion lasts for more than ten seconds, the mode timer resets to zero (mt=0) and timing resumes. The minimum high-speed mode length is determined as described in paragraph (g)(2) of this section. The maximum high-speed mode length is 90 seconds elapsed time (mt=90).

(2) The pass/fail analysis begins after an elapsed time of ten seconds (mt=10). A pass or fail determination is made for the vehicle and the mode terminated as described in paragraphs (g)(2)(i) through (iii) of this section.

(i) The vehicle passes the high-speed mode and the mode is terminated at the end of an elapsed time of 30 seconds (mt=30) if the measured values are less than or equal to the applicable short test standards as described in paragraph (d)(4) of this section.

(ii) The vehicle passes the high-speed mode and the mode is immediately terminated if, at any point between an elapsed time of 30 seconds (mt=30) and 90 seconds (mt=90), the measured values are less than or equal to the applicable short test standards as described in paragraph (d)(4) of this section.

(iii) The vehicle fails the high-speed mode and the test is terminated if none of the provisions of paragraphs (g)(2) (i) and (ii) of this section is met by an elapsed time of 90 seconds (mt=90).

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### § 86.1438 Test run—EPA.

(a) This section describes the test run performed by the Administrator for confirmatory testing pursuant to issuing a certificate of conformity under the provisions of § 86.091–29. The Administrator may also employ this procedure for Selective Enforcement Audit and recall purposes. For recall program testing, in-use vehicles will be set to manufacturer's specifications prior to conduct of the CST. The test run consists of the wait time, vehicle preconditioning, and the selected test procedure. The test run is performed in accordance with the conditions in the option selected from table O–96–2 of § 86.1430. If the CST is performed in conjunction with other confirmatory testing in accordance with § 86.1432(b)(2) and (c)(2), the vehicle must undergo the CST at the same specified ambient temperature range as that of the other confirmatory testing performed immediately prior to the optional vehicle soak, except as specified in paragraphs (a) (1) and (2) of this section.

(1) If the transient confirmatory testing was performed at the moderate temperature range specified in § 86.1430 and utilized Otto-cycle test fuel, it may optionally be followed by a CST sequence as described in § 86.1432 (b) and (c) at the warm ambient temperature range.

(2) If the transient confirmatory testing was performed at the moderate temperature range specified in § 86.1430 and utilized Cold CO test fuel, it may optionally be followed by a CST sequence as described in § 86.1432 (b) and (c) at the moderate ambient temperature range, except that if the ambient temperature exceeds 80 °F (27 °C) at any point for the remainder of the sequence from the wait time forward, a non-passing test result renders the test void.

(b) *Wait time.* (1) If the vehicle is not already idling, the vehicle is started and allowed to idle freely with the transmission in neutral. The vehicle wait time begins when the vehicle engine speed is between 350 and 1100 rpm. The specified idle speed range must be attained within ten seconds of beginning the idle operation. A timer for the wait time portion of the test run will initiate (wt=0) when it returns to idle